

What is claimed is:

1 1. A method of assigning paths through an interconnection network consisting of a
2 plurality of switching elements and a plurality of links coupling the switching elements, the
3 method comprising the steps of:

4 using physical restrictions of the interconnection network to arrive at a logical
5 representation of an architecture of the interconnection network;

6 determining traffic patterns of the interconnection network to balance the data traffic
7 through the links coupling the switching elements; and

8 using the logical representation and traffic patterns of the interconnection network
9 to setup virtual channel identifiers that determine paths through the switching elements
10 and links so that data traffic is more evenly distributed through the interconnection
11 network.

1 2. The method according to claim 1, wherein the physical restrictions are based on a
2 speed of the switching element.

1 3. The method according to claim 1, wherein the physical restrictions are based on a
2 configuration of the interconnection network.

1 4. The method according to claim 1, wherein the physical restrictions are based on a
2 number of stages in the interconnection network.

1 5. The method according to claim 4, wherein the number of stages is four in the
2 interconnection network.

1 6. The method according to claim 4, wherein the physical restrictions are further based
2 on a number of switching elements in each stage in the interconnection network.

1 7. The method according to claim 6, wherein the number of switching elements in each
2 stage in the interconnection network is sixteen.

1 8. The method according to claim 1, wherein the physical restrictions are based on a
2 number of ports for each switching element in the interconnection network.

1 9. The method according to claim 1, wherein the logical representation of the architecture
2 of the interconnection network is a bit representation of the interconnection network.

1 10. The method according to claim 1, wherein the logical representation of the
2 architecture of the interconnection network is a permutation function of the architecture of
3 the interconnection network.

1 11. The method according to claim 1, wherein the traffic patterns of the interconnection
2 network are balanced through switching elements of different speeds.

1 12. The method according to claim 1, wherein the virtual circuit identifiers identify a source
2 link identifier for the paths through the switching elements.

1 13. The method according to claim 12, wherein the source link identifier includes a
2 switching element identifier and an input port identifier.

1 14. The method according to claim 1, wherein the virtual circuit identifiers identify a
2 destination link identifier for the paths through the switching elements.

1 15. The method according to claim 14, wherein the destination link identifier includes a
2 switching element identifier and an output port identifier.

1 16. A method of assigning paths through an interconnection network consisting of a
2 plurality of switching elements and a plurality of links coupling the switching elements, the
3 method comprising the steps of:

4 mapping the interconnection network with a virtual circuit identifier, the virtual circuit
5 identifier based on physical restrictions and traffic patterns of the network; and

6 using the virtual circuit identifier to assign a path for data through the
7 interconnection network from an input port to an output port.

1 17. The method according to claim 16, wherein the wherein the physical restrictions are
2 based on a speed of a switching element in the network.

1 18. The method according to claim 16, wherein the physical restrictions are based on a
2 configuration of the interconnection network.

1 19. The method according to claim 16, wherein the physical restrictions are based on a
2 number of stages in the interconnection network.

1 20. The method according to claim 19, wherein the number of stages is four in the
2 interconnection network.

1 21. The method according to claim 19, wherein the physical restrictions are further based
2 on the number of switching elements in each stage in the interconnection network.

1 22. The method according to claim 21, wherein the number of elements in each stage in
2 the interconnection network is sixteen.

1 23. The method according to claim 16, wherein the physical restrictions are based on a
2 number of ports for each switching element in the interconnection network.

1 24. The method according to claim 16, wherein the logical representation of the
2 architecture of the interconnection network is a bit representation of the interconnection
3 network.

1 25. The method according to claim 16, wherein the logical representation of the
2 architecture of the interconnection network is a permutation function of the architecture of
3 the interconnection network.

1 26. The method according to claim 16, wherein the virtual circuit identifier identifies a
2 source link identifier for a path through a switching element.

1 27. The method according to claim 26, wherein the source link identifier includes a
2 switching element identifier and the input port identifier in the switching element.

1 28. The method according to claim 16, wherein the virtual circuit identifier identifies a
2 destination link identifier for a path through a switching element.

1 29. The method according to claim 28, wherein the destination link identifier includes a
2 switching element identifier and an output port identifier in the switching element.

1 30. A system for routing data, comprising:

2 a switching network including a plurality of switching elements and plurality of links
3 coupled to the switching elements for providing a routing path for the data; and
4 a virtual circuit identification algorithm in communication with the switching network
5 for providing an even distribution of data traffic through the switching network.

1 31. The system according to claim 31, wherein the switching elements are grouped into
2 a number of stages.

1 32. The system according to claim 30, wherein the switching network further comprises
2 a logic unit for determining the physical restrictions of the switching network.

1 33. The system according to claim 30, wherein the switching network further comprises
2 logic for balancing data traffic through the plurality of links using traffic patterns of the
3 switching network.